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(71) Applicant: **SHARP CORP**

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(72) Inventor: **MUKAI MICHIAKI**

(54) **NETWORK CONNECTION AUTOMATIC  
CHANGEOVER SYSTEM**

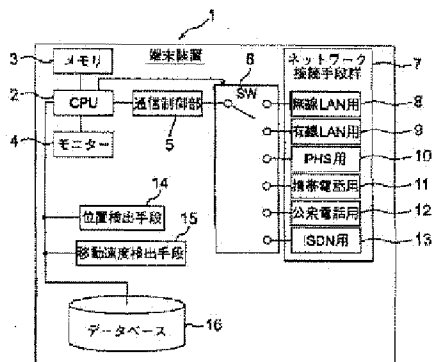
information stored in the database.

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(57) Abstract:

PROBLEM TO BE SOLVED: To realize a network connection automatic changeover system with high user-friendliness by which a terminal can automatically select and set optimum network connection means, even if the terminal is in the process of moving or is located at a mobile destination.

SOLUTION: The network changeover system for the terminal, having a plurality of network connection means, is provided with a position detection means, a mobile speed detection means, a database-storing connection information, and a changeover control means that automatically selects the network connection means on the basis of the position information of the terminal obtained from the position detection means, the mobile speed information of the terminal obtained from the mobile speed detection means, and the connection



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CLAIMS

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## [Claim(s)]

[Claim 1]Are two or more network connection means a network automatic-switching system for a terminal unit which it has, and A position detecting means, Position information on a travelling speed detection means, a database which stored an initial entry, and said terminal unit obtained from said position detecting means, A network automatic-switching system having a switching control means which changes said network connection means automatically based on movement speed information on said terminal unit obtained from said travelling speed detection means, and an initial entry stored in said database.

[Claim 2]A network automatic-switching system storing information which matches with position information and movement speed information, and shows classification of an input and setup information for network connection, and a network connection means to said database in claim 1 statement.

[Claim 3]A network automatic-switching system which information shown, respectively adding a priority of each network connection means, and storing in claim 2 statement when there are two or more network connection means corresponding to the same position information and movement speed information in said database.

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the network automatic-switching system for a movable terminal unit, and relates to the art which changes a terminal unit to proper networks, such as LAN and a telephone network, automatically, and was connected according to the situation where the terminal unit set especially.

[0002]

[Description of the Prior Art]Generally, in the radio communications system represented by a cellular phone, PHS, wireless LAN, etc., when having communicated with a terminal unit and there were two or more connecting means to a network, it was required to change a connecting means by manual operation.

[0003]For example, although using an Internet communication network for high speed data transfer etc. enables it to choose a purpose-oriented transmission route as the data transfer between data terminals using wireless LAN in "an integrated radio communications system and a correspondence procedure" given in JP,9-130405,A, A user needs to set up under movement of a terminal unit and the network which connects in a movement destination each time.

[0004]

[Problem(s) to be Solved by the Invention]As mentioned above, the art which chose the network connection means as purpose-oriented exists, but. Whether a terminal unit is moving or is in a movement destination, the optimal network means is chosen, it connects with a network automatically, and the art which enabled it to enjoy Internet services etc. is not found.

[0005]Whether a terminal unit is moving or the purpose of this invention is in a movement destination, there is in realizing the network connection automatic-switching system with convenience high for a user which can choose the optimal network connection means and can be set up automatically.

[0006]

[Means for Solving the Problem] In a network automatic-switching system for a terminal unit which has two or more network connection means in order that this invention may attain the above-mentioned purpose, A position detecting means, a travelling speed detection means, and a database that stored an initial entry, Position information on said terminal unit obtained from said position detecting means, movement speed information on said terminal unit obtained from said travelling speed detection means, Based on an initial entry stored in said database, it is constituted as what has a switching control means which changes said network connection means automatically.

[0007]

[Embodiment of the Invention] Hereafter, an embodiment of the invention is described using a drawing. Drawing 1 is a block diagram showing the composition of the network automatic-switching system concerning one embodiment of this invention.

[0008] A movable terminal unit which consists of an information terminal etc. which can use 1 in drawing 1, for example carrying in vehicles, such as a Personal Digital Assistant which can be carried, or a car, CPU in which 2 manages generalization control of the whole system, the memory by which three are used for works, A communication control part and 6 the monitor by which 4 can display various kinds of information, and 5 A changeover switch part, 7 a network connection means group and 8 the terminal area for wireless LAN, and 9 The terminal area for cable LAN, 10 the modem section for PHS, and 11 the modem section for cellular phones, and 12 The modem section for public lines, The position detecting means from which 13 detects the terminal area for ISDN and 14 detects the current position of the terminal unit 1, the travelling speed detection means from which 15 detects the present movement speed of the terminal unit 1, and 16, In order to choose the network connection means according to the situation where the terminal unit 1 set, it is the database which stored the initial entry which consists of a connection rule, information (parameter) required for network connection, such as a domain, etc.

[0009] The position detecting means 14 is realized by a GPS device and the detecting position providing service by PHS, for example, and the travelling speed detection means 15 is realized by the speed arithmetic means which uses the periodic detection information from the position detecting means 14, for example.

[0010] Although the position detecting means 14 and the travelling speed detection means 15 are built in the terminal unit 1 here in the example shown in drawing 1, When it may connect with the terminal unit 1 by external or the terminal unit 1 is carried in a car, even if these borrow the detecting position of the car navigation device with which the car was equipped beforehand, and a speed detection function, they do not interfere. The database 16 can also substitute the memory card with which the terminal unit 1 is equipped enabling free attachment and detachment.

[0011] In the composition shown in drawing 1, if CPU2 receives the connection command to the network by a user, Or if network cutting is detected, or if it detects that the signal-transmission grace with a network deteriorated, CPU2 will make connection with a network automatically according to the flow shown in drawing 2, for example in order to receive Internet services.

[0012] The process flow of drawing 2 is explained. First, in Step S1, the present position information is acquired and the present speed information is acquired from the position detecting means 14 from the travelling speed detection means 15 in Step S2. Next, in [ in Step S3, search the contents of the database 16, acquire information (parameter) required for network connection, such as a domain, based on position information and speed information, and ] step S4, While making alternative selection of the network connection means corresponding to the acquired parameter, a parameter required for network connection is set and connection with a network (Internet) is aimed at. And if connection is completed

in Step S5, the process flow of drawing 2 is ended, and if not connectable, it will return to Step S3, and the candidate of the following network connection means will be searched.

[0013]The selection technique of the above-mentioned network connection means is explained. Drawing 3 shows one example of the initial entry stored in the database 16. In this example shown in drawing 3, information, including a position, movement speed, an address, a net mask, a default gateway, a domain name, a host name, a connectable communication method, etc., is stored in the database 16, respectively. An address is an individual IP address at the time of connecting the terminal unit 1 to a network, A net mask is the information for carrying out grouping of the IP address and using, A default gateway is an IP address of a communication destination, it is the information which shows to which network domain the domain name belongs, and a host name is a name of the terminal unit 1, and when these connect the terminal unit 1 to a network, they are information inputted and set up. A communication method is information which specifies one of the connecting means in the network connection means group 7. When using the contents of such a database, CPU2, When the connectable communication method (network connection means) applicable to the acquired position and the information on movement speed is searched as a round robin and two or more connectable network means exist, Connection with a network (Internet services) is made using the network connection means found first.

[0014]Drawing 4 shows one example of everything but the initial entry stored in the database 16. In this example shown in drawing 4, information, including a connection priority, a position, movement speed, an address, a net mask, a default gateway, a domain name, a host name, a connectable communication method, etc., is stored in the database 16, respectively. A connection priority is information which determines these priorities, when two or more communication methods (network connection means) in which connection when position information and movement speed information are the same is possible exist. When using the contents of such a database, CPU2, When the connectable communication method (network connection means) applicable to the acquired position and the information on movement speed is searched as a round robin and two or more connectable network means exist, Connection with a network (Internet services) is made using the highest network connection means of a connection priority.

[0015]For example, when the terminal unit 1 exists in a home and an office. It sees from viewpoints of cooperation with other apparatus connected to LAN, etc., and the direction linked to home LAN or LAN in an office is efficient, and, in such a case, sets up the priority of the terminal area 8 for wireless LAN, or the terminal area 9 for cable LAN at a higher rank. When the terminal unit 1 is moving at high speed, since it cannot communicate during high speed movement by the standard of PIAFS in a PHS communication network, set up as a communication method (network connection means) which can connect only the cellular-phone modem section 11, but. When the terminal unit 1 is moving at a low speed, since transmission speed is quick in comparison, PHS sets the priority of the PHS modem section 10 as a higher rank rather than the cellular-phone modem section 11. Thus, according to position information and movement speed information, in consideration of access speed, economical efficiency, convenience, etc., a case division is carried out and the priority is set up beforehand.

[0016]Although the user shall have determined the above-mentioned priority in an initial state, this priority can also be enabled it to change automatically in condition of use. For example, it may be made to change a priority into the strong order of radio field intensity automatically. Or it may be made to change a priority automatically using radio field intensity, a position, and the valuation function that considers at least one of movement speed as an input. For example, what is necessary is that is, just to change a priority automatically with the value of a valuation plan like  $F=a_1 \cdot X+a_2 \cdot Y+a_3 \cdot Z$ , when an evaluation value is set to F and Z,  $a_1$ ,  $a_2$ , and  $a_3$  are made [ radio field intensity / X and

the evaluation value of a place (position) ] into a constant coefficient for Y and the evaluation value of movement speed. A valuation plan may be a non-line type equation.

[0017]When there are few network connection means, it may be made to try connection regardless of a position (place) and movement speed using each network connection means as a round robin. Drawing 5 shows one example of further others of the initial entry stored in the database 16. In the example shown in drawing 5, information, including a connection priority, an address, a net mask, a default gateway, a domain name, a host name, a connectable communication method, etc., is stored in the database 16, respectively. When using the contents of such a database, CPU2 tries connection with a network according to a priority, and if it succeeds in connection, it will complete processing.

[0018]The initial entry stored in the database 16 can store things arbitrary besides the information mentioned above, for example, it may be made to store the information on a DNS (domain name server) address etc. you hold the information on the result (a connection success -- or unsuccessful) of having tried connection, as learning information, and it may be made to make it reflected in next automatic connection operation

[0019]It becomes possible to enjoy service by the Internet, without a user performing detailed setting required for network connection, even if it is a movement destination, while the terminal unit 1 moves by using the automatic connection technique which was described above.

[0020]Although the embodiment which illustrated this invention above explained, it is not necessary to say a person skilled in the art that various modification is possible in the range which does not deviate from the pneuma of this invention.

[0021]

[Effect of the Invention]According to this invention, it becomes possible to enjoy service by the Internet as mentioned above, without a user performing detailed setting required for network connection, whether a terminal unit is moving or is in a movement destination. The network connection automatic-switching system with convenience high for a user which can choose automatically the optimal network connection means according to a position and movement speed, and can set it up is realizable by setting up the position and the priority according to movement speed.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]It is a block diagram showing the composition of the network connection automatic-switching system concerning one embodiment of this invention.

[Drawing 2]It is a process flow figure showing one example of the automatic connection processing to the network in one embodiment of this invention.

[Drawing 3]It is an explanatory view showing one example of the initial entry stored in the database of drawing 1.

[Drawing 4]It is an explanatory view showing one example of everything but the initial entry stored in the database of drawing 1.

[Drawing 5]It is an explanatory view showing one example of further others of the initial entry stored in the database of drawing 1.

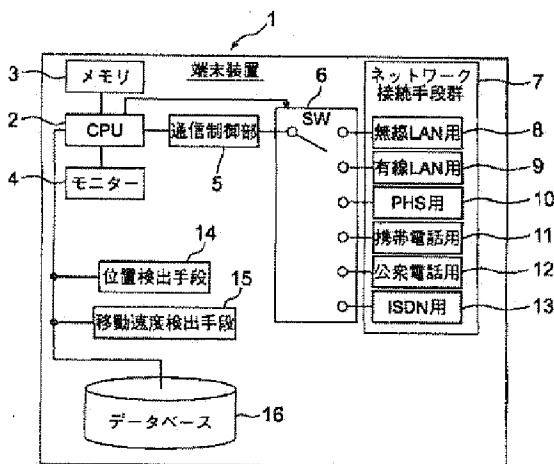
[Description of Notations]

- 1 Terminal unit
- 2 CPU
- 3 Memory
- 4 Monitor

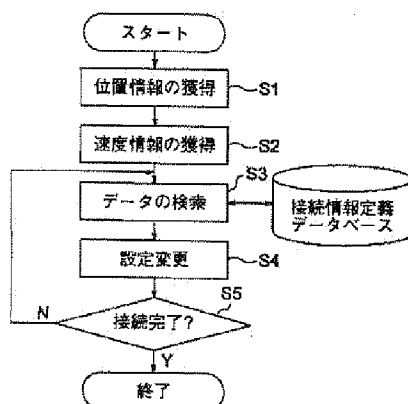
- 5 Communication control part
- 6 Changeover switch part
- 7 Network connection means group
- 8 The terminal area for wireless LAN
- 9 The terminal area for cable LAN
- 10 The modem section for PHS
- 11 The modem section for cellular phones
- 12 The modem section for public lines
- 13 The terminal area for ISDN
- 14 Position detecting means
- 15 Travelling speed detection means
- 16 Database

## DRAWINGS

[Drawing 1]



[Drawing 2]



[Drawing 3]

| 位置 | 速度     | アドレス           | ネットマスク        | デフォルト<br>ゲートウェイ | ドメイン<br>ネーム | ホストネーム | 通信方式 | ... |
|----|--------|----------------|---------------|-----------------|-------------|--------|------|-----|
| A  | 停止     | 183.220.34.xxx | 255.255.255.0 | 183.220.34.yyy  | zzz         | win1   | ABC  |     |
| B  | 停止     | ...            | ...           | ...             | ...         | ...    | ...  |     |
| C  | 停止     | ...            | ...           | ...             | ...         | ...    | ...  |     |
| A  | 30km以下 | ...            | ...           | ...             | ...         | ...    | ...  |     |
| A  | 30km以上 | ...            | ...           | ...             | ...         | ...    | ...  |     |
| B  | 30km以下 | ...            | ...           | ...             | ...         | ...    | ...  |     |
| B  | 30km以上 | ...            | ...           | ...             | ...         | ...    | ...  |     |

[Drawing 4]

| 優先<br>順位 | 位置 | 速度 | アドレス           | ネットマスク | デフォルト<br>ゲートウェイ | ドメイン<br>ネーム | ホストネーム | 通信方式 | ... |
|----------|----|----|----------------|--------|-----------------|-------------|--------|------|-----|
| 1        | A  | 停止 | 183.220.34.xxx | ...    | ...             | ...         | ...    | ...  |     |
| 2        | B  | 停止 | ...            | ...    | ...             | ...         | ...    | ...  |     |
| 3        | C  | 停止 | ...            | ...    | ...             | ...         | ...    | ...  |     |

[Drawing 5]

| 優先<br>順位 | アドレス           | ネットマスク | デフォルト<br>ゲートウェイ | ドメイン<br>ネーム | ホストネーム | 通信方式 | ... |
|----------|----------------|--------|-----------------|-------------|--------|------|-----|
| 1        | 183.220.34.xxx | ...    | ...             | ...         | ...    | ...  |     |
| 2        | ...            | ...    | ...             | ...         | ...    | ...  |     |
| 3        | ...            | ...    | ...             | ...         | ...    | ...  |     |